

REMARKS

Claims 1-18 and 20 are pending. Reconsideration and allowance of the present application based on the following remarks are respectfully requested.

Claim Rejections Under 35 U.S.C. § 103

A. Claims 1-4 were rejected under 35 U.S.C. § 103(a) over DeBoer et al. (U.S. Patent No. 5,910,880). Applicants respectfully traverse this rejection.

Claim 1 recites, in part, a method for fabricating a capacitor of a semiconductor device which includes forming a lower electrode on a semiconductor substrate and forming a dielectric layer on the lower electrode by nitriding an upper surface of the lower electrode using in-situ plasma before forming a first amorphous TaON thin film. The Office Action indicates that DeBoer teaches forming a lower electrode 34 on a substrate 32 and forming a first amorphous TaON layer 38 on the lower electrode. The Office Action then alleges that DeBoer teaches nitriding an upper surface of the lower electrode using in-situ plasma before forming a first amorphous TaON thin film, relying on column 4, lines 39-41). Applicants respectfully disagree. DeBoer actually teaches (column 4, lines 39-41) converting the amorphous layer 38 to a crystalline form, not the lower electrode 34. Accordingly, DeBoer does not teach or suggest nitriding an upper surface of the lower electrode using in-situ plasma before forming a first amorphous TaON thin film, as recited in claim 1.

Claims 2-4 are believed allowable for at least the same reasons presented above with respect to claim 1 by virtue of their dependence upon claim 1. Accordingly, Applicants respectfully request reconsideration and withdrawal of this rejection.

B. Claims 5-18 and 20 were rejected under 35 U.S.C. § 103(a) over DeBoer in view of Yang et al. (U.S. Patent No. 5,956,594) Applicants respectfully traverse this rejection.

Claim 20 is believed allowable for at least the same reasons presented above with respect to claim 1 because claim 20 recites, nitriding the upper surface of the lower electrode. As discussed above, DeBoer does not teach or suggest such a feature and Yang does not remedy this deficiency.

Claims 5-18 are believed allowable for at least the same reasons presented above with respect to claim 1 by virtue of their dependence upon claim 1. Accordingly, Applicants respectfully request reconsideration and withdrawal of this rejection.

14. (Previously Presented) The method according to claim 1, wherein the annealing steps further comprise a plasma treatment in an NH_3 or N_2O atmosphere.

15. (Previously Presented) The method according to claim 1, wherein the annealing steps further comprise a low-temperature annealing process in a UV- O_3 or O_3 atmosphere.

16. (Previously Presented) The method according to claim 1, wherein the annealing steps further comprise heating the amorphous TaON thin film to a temperature between 650 and 950°C under an atmosphere of N_2O , O_2 , or N_2 .

17. (Previously Presented) The method according to claim 1 wherein the step of nitriding an upper surface of the lower electrode using in-situ plasma is applied under an NH_3 atmosphere for 1 to 5 minutes.

18. (Previously Presented) The method according to claim 1 wherein forming the lower electrode further comprises treating the surface of the lower electrode with a plasma in an N_2O atmosphere to form a thin, homogeneous, oxide layer before forming the first amorphous TaON thin film.

19. (Previously Cancelled)

20. (Previously Presented) A method for fabricating capacitors for semiconductor devices, comprising:

forming a lower electrode on a semiconductor substrate;

nitriding an upper surface of the lower electrode in an NH_3 atmosphere;

forming a first amorphous TaON thin film over the lower electrode;

annealing the first amorphous TaON thin film in an NH_3 atmosphere;

forming a second amorphous TaON thin film;

annealing the second amorphous TaON thin film at least once, thereby forming a TaON dielectric film having a multi-layer structure; and

forming an upper electrode over the TaON dielectric film.